

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:
input means for entering information for a
designated position on an image;
5 extraction means for extracting the boundary of
said image in accordance with said information that is
entered and the characteristics of said image;
decision means for deciding to obtain one part of
an outline using said extraction means; and
10 processing means for linking a plurality of
outlines obtained through a plurality of decisions made
by said decision means, and for determining the limits
of a closed area.
- 15 2. An image processing apparatus according to
claim 1, wherein said decision means includes selection
means for selecting one part of said outline extracted
by said extraction means, and a part to be selected is
determined by a manual instruction of a user.
- 20 3. An image processing apparatus according to
claim 1, wherein said characteristic of said image is
either a density, a color or a texture, or a
combination of a density, a color and a texture.
- 25 4. An image processing apparatus according to
claim 1, wherein said information for said position is

entered by said user, and is either one point in an image, outline tracing, dot formation or enclosing.

5 5. An image processing apparatus according to claim 1, wherein said decision is made for a plurality of portions that constitute said outline.

10 6. An image processing apparatus according to claim 1, wherein said extraction means performs a plurality of extraction processes in parallel to a single image.

15 7. An image processing apparatus according to claim 6, wherein said plurality of extraction processes include an area base type, a trace type and an enclosure line type.

20 8. An image processing apparatus according to claim 1, wherein said processing means includes inquiry means for confirming whether a determined closed area is to be corrected, and wherein, in accordance with the results of the inquiry, said processing means corrects said closed area.

25 9. An image processing apparatus according to claim 1, wherein the end of said outline that is authenticated is displayed on a display device to be

identified.

10. An image processing apparatus according to claim 9, wherein the end point of said outline is displayed by using a figure symbol.

11. An image processing method comprising:
an input step of entering information for a designated position on an image;
an extraction step of extracting the boundary of said image in accordance with said information that is entered and the characteristics of said image;
a decision step of deciding to obtain one part of an outline at said extraction step; and
a processing step of linking a plurality of outlines obtained through a plurality of decisions made at said decision step, and of determining the limits of a closed area.

12. A computer-readable storage medium on which an image processing program is stored, said image processing program comprising:
an input step of entering information for a designated position on an image;
an extraction step of extracting the boundary of said image in accordance with said information that is entered and the characteristics of said image;

a decision step of deciding to obtain one part of
an outline at said extraction step; and

a processing step of linking a plurality of
outlines obtained through a plurality of decisions made
5 at said decision step, and of determining the limits of
a closed area.

13. An image processing apparatus comprising:

designation means for designating a closed outline
10 in an arbitrary shape;

setting means for setting a predetermined standard
point based on said designated outline;

division means for employing image data in a
plurality of areas in a predetermined shape, each of
15 which includes a line segment connecting a
predetermined point on said outline to said standard
point, to divide said outline into said plurality of
areas; and

processing means for renewing said outline based
20 on dividing point positions obtained by the division,
and for obtaining the shape including the outline that
is renewed.

14. An image processing apparatus according to
25 claim 13, wherein said processing means is used to
extract an object enclosed by an outline, and said
designation means sets an outline so as to involve said

object inside.

15. An image processing apparatus according to claim 13, wherein said processing means is used to
5 extract an object enclosed by an outline, and said designation means sets an outline inside said object.

16. An image processing apparatus according to claim 13, wherein said setting means sets said standard
10 point to the position of the center of gravity of said outline.

17. An image processing apparatus according to claim 13, wherein said setting means sets said standard
15 point at a plurality of positions in said outline.

18. An image processing apparatus according to claim 17, wherein said areas in said predetermined
20 shape are determined by selecting the standard point that is closest to a point on said outline.

19. An image processing apparatus according to claim 13, wherein said areas in said predetermined
25 shape are areas for which points of said outline are sampled at a predetermined interval and in which line segments connecting sampling points and said standard points are included.

20. An image processing apparatus according to claim 13, wherein said processing means sets a renewal interval for said outline, and renews said outline based on said dividing point positions in said areas in said predetermined shape, including a point on said outline at said renewal interval.

21. An image processing apparatus according to claim 20, wherein it is selectable by said processing means to renew all of the set outline or to renew the outline by setting the renewal interval.

22. An image processing apparatus according to claim 13, wherein said processing means obtains said outline shape by tracing an outline for image data in a thick line area including said outline that is renewed.

23. An image processing apparatus according to claim 13, wherein said processing means calculates a predetermined estimation function for said outline that is renewed, and calculates said outline shape for said object through a dynamic outline process for moving individual points on said outline to positions where an estimation function value is minimum.

24. An image processing apparatus according to claim 13, wherein said processing means increases a

resolution for the area division as the number of renewals of an outline is increased, and reduces a sampling interval for an outline as the number of renewals of said outline is increased.

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25. An image processing method comprising:

a designation step of designating a closed outline in an arbitrary shape;

10 a setting step of setting a predetermined standard point based on said designated outline;

a division step of employing image data in a plurality of areas in a predetermined shape, each of which includes a line segment connecting a predetermined point on said outline to said standard point, to divide said outline into said plurality of areas; and

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a processing step of renewing said outline based on dividing point positions obtained by the division, and of obtaining the shape including the outline that is renewed.

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26. A computer-readable storage medium on which an image processing program is stored, said image processing program comprising:

25 a designation step of designating a closed outline in an arbitrary shape;

a setting step of setting a predetermined standard

point based on said designated outline;

a division step of employing image data in a plurality of areas in a predetermined shape, each of which includes a line segment connecting a

5 predetermined point on said outline to said standard point, to divide said outline into said plurality of areas; and

a processing step of renewing said outline based on dividing point positions obtained by the division,
10 and of obtaining the shape including the outline that is renewed.

27. An image processing method comprising:

an image input step of entering an image including
15 an object to be extracted;

an outline setup step of setting a closed outline in a predetermined shape;

an outline renewal step of renewing said predetermined shape of said closed outline by a
20 predetermined method;

a renewal result display step of displaying the renewed outline by superimposing said renewed outline onto an input image;

an instruction input step of instructing to halt
25 or start the renewal of said outline; and

an outline output step of outputting the shape of said renewed outline.

28. An image processing method according to claim 27, wherein said outline renewal step further comprises:

5 a renewal interval setup step of designating a renewal interval on said outline;

a non-renewal interval step of designating a non-renewal interval on said outline; and

10 a outline part renewal step of renewing the shape of said outline at said renewal interval using a predetermined method.